

NOAA NESDIS
Central Satellite Data Processing Center



**Comprehensive Large Array-data
Stewardship System (CLASS)
Archive and Access Requirements**

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Functional and Performance Requirements For CLASS

1.0 Introduction

The following requirements are submitted in response to the Statement of Work for Task-19 issued under IPD contract NO. 50-SANE-6-00028, with Computer Sciences Corporation (CSC).

1.1 Scope

This document is based on the National Environmental Satellite, Data, and Information Service (NESDIS) Comprehensive Large Array-data Stewardship System (CLASS), functional and performance requirements in the areas of: data discovery, data access, sub-setting and super-setting, visualization, on-line user assistance, archive/preservation, data retrieval, data delivery and migration. The CLASS portal is required to make all data archived by NESDIS accessible virtually through one site. These CLASS requirements should allow use of existing tools and procedures from the NOAA National Data Centers (NNDC) without requiring redesign of legacy systems. The requirements will have a phased implementation, based on a implementation strategy to be approved by NESDIS management, which satisfies the CLASS stewardship of data. Appendix A describes the requirements for the Archive and Distribution Segment (ADS) functional and performance requirements for the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) mission. Appendix B describes the requirements for the Initial Joint Polar-orbiting Operational Satellite System (IJPS). Both of these system requirements are considered part of CLASS.

1.2 Applicable Documents

Doc #	Title	Reference Number	Issue	Date
AD-1	Polar-orbiting Operational Environmental Satellite System Requirements for Initial Joint Polar System	NO-IJ/OSD_99_0004_R0U0 http://discovery.osd.noaa.gov/ijps/Public/pdf/SysReq_RDN4.PDF	Final	10/20/99
AD-2	NESDIS List of IJPS Day One Products		Draft	08/28/00
AD-3	Polar Operational Environmental Satellite Ground Segment Upgrade Description & Requirements For Initial Joint Polar Satellite System	NO-IJ/OSD-99-0005-R0U0 http://discovery.osd.noaa.gov/ijps/Public/pdf/RDN5_V_1a.PDF	Final	05/15/00
AD-4	NOAA/NESDIS Enterprise Information Technology Architecture Plan		Draft	07/13/00
AD-5	Data Denial Implementation Plan (DDIP) for The Co-operation between NOAA and EUMETSAT on the Initial Joint Polar System (IJPS) Program	http://discovery.osd.noaa.gov/ijps/Private/Ddipv_1.pdf	Draft v1.0	02/20/01
AD-6	Reference Model for an Open Archival Information System (OAIS) – reference document contains useful information (optional reading)	CCSDS 650.0-R-1 http://www.ccsds.org/documents/pdf/CCSDS_650.0_R_1.pdf	1	05/99
AD-7	NOAA Archive and Access Architecture		1	04/17/00

Doc #	Title	Reference Number	Issue	Date
AD-8	Global Change Science Requirements for Long_Term Archiving, Report of the Workshop Oct 28_30, 1998			03/99
AD-9	NPP Master Schedule	http://jointmission.gsfc.nasa.gov/PDF'S/NPP_Master_0630.PDF		06/30/00
AD-10	NPP Mission System and Operations Concept (Volume 1)	GSFC 429_99_02_02		7/11/00
AD-11	NPP Mission System and Operations Concept Data Dictionary (Volume 2)	GSFC 429_99_02_02		7/11/00
AD-12	NPP Mission Requirements Specification, Volume 1, (Level 2)	GSFC 429_99_02_03		6/12/00
AD-13	NPP Mission Requirements Specification, Volume 2, (Level 2)	GSFC 429_99_02_03		6/12/00
AD-14	NOAA-KLM User's Guide			9/00
AD-15	NASA-NOAA Long-Term Archive Implementation Plan, Working Draft 0.3		0.3	9/11/00
AD-16	Issues in the Integration of Research and Operational Satellite Systems for Climate Research: Part I. Science and Design, Committee on Earth Studies, Space Studies Board, National Research Council	http://books.nap.edu/catalog/9963.html		2000
AD-17	NCDC National Virtual Data System (NVDS) Architecture			9/11/00
AD-18	NGDC National Virtual Data System Architecture			8/01/00
AD-19	NODC National Virtual Data System Architecture			9/06/00
AD-14xx	Climate Processing and Archive Strategies for the NPP and NPOESS, NRC report by the Committee on Earth Studies	TBD		(In review)

1.3 Definitions

Novice Customer – Customer new to NOAA data.
Intermediate Customer – Somewhat experienced with NOAA data.
Power Customer – Experienced NOAA data user.
Backplane connectivity – Direct connect; no external telecommunications.
Subscription – Standing order for a particular data type.
Spawn – Generate/start.

1.4 Degree of Compliance Required

Shall -- absolute compliance is required.
Preferred or should -- Use of an alternate must be justified.
May -- The developer's selection is acceptable.
Will -- This is a declaration by the client that some item or service will be available for use when needed.

2.0 System Overview

2.1 System Functional Overview

CLASS will be based on a series of interconnected and interoperable data and information management

components, each of which will satisfy a major functional data stewardship requirement area. These functional components will be organized within an envelope of a CLASS process management configuration and the entire CLASS architecture organized and integrated through an overall system management configuration. These components will be designed, developed, tested, integrated, operated, and maintained under configuration management (CM) processes and procedures as a series of transportable software, procedures (scripts, naming conventions, object oriented (OO) compositions, etc.), and operating “rules” packages.

2.2 External Interfaces

CLASS will have external interfaces to the various data suppliers to receive all data sets approved to be archived by CLASS. CLASS, through an access portal, will also have an external interface to CLASS customers for viewing and ordering data and a distribution interface for the customer to receive their data. CLASS sites will also interact with other CLASS sites.

2.3 System Constraints

Constraints on the CLASS system are in the areas of:

- Timeliness of operational data set(s) availability to the customer
- Ability to ingest and store the increasing volume of data
- Telecommunications bandwidth
- Ability to incorporate legacy systems into CLASS
- Security of the data and systems
- Physically distributed systems
- Multiple organizations

3.0 System Requirements

The CLASS system shall meet or exceed the requirements stated in appendix A and B. The appendices are meant to be complete for someone to use, in as much as possible without referring to the main CLASS document.

3.1 Functional Requirements

The functional CLASS data management components will include:

- Data Ingest
- Data Preparation and Quality Assessment
- Data Storage
- Customer Access
- Data Retrieval/Repackaging
- Data Distribution
- Data Migration

3.1.1 Data Ingest

3.1.1.1 Receipt

CLASS shall receive 98.4% of data from data suppliers. Most data shall be ingested as made available by the provider through either backplane connectivity (co-location) or through dedicated, NESDIS managed,

high-speed telecommunication links. Some in-situ data will be received through slower conventional means. Although these in-situ data sets will not be the initial phase of CLASS they shall be scheduled to become part of the CLASS.

3.1.1.2 Initial Storage

Most data shall be stored on network attached or network accessible digital media. Through agreement with provider(s) and as practical as possible, data shall be maintained at the provider facility until such time as the CLASS ingest process is completed.

3.1.1.3 Data Assessment

Data transmissions shall be automatically tested for completeness (sent = received), integrity, and replication (whole or in-part) with previous transmissions. Retransmissions may be required, reverting to Receipt, above. Data received in more conventional means will follow NNDC established procedures to ensure data integrity and completeness.

3.1.1.4 Inventory

Initial inventory information (or functional metadata) shall be automatically derived from data set naming convention or a combination of naming conventions, data scan, and determined data quality for lower volume data sets.

3.1.1.5 Subscription Preparation

Initial inventory information shall be scanned for predefined customer selection criteria for delivery. Data which meet these criteria (“push” or “pull”) shall be migrated (physically or virtually) to customer-accessible storage facilities (e.g. FTP sites).

3.1.1.6 Subscription Delivery

Predetermined set of customers (“push” subscribers) that have data meeting their selection criteria shall be delivered via dedicated links or the Internet.

3.1.1.7 Subscription Notification

Predetermined set of customers (“pull” subscribers) shall be notified of data availability within their selection criteria.

3.1.1.8 Data Depiction

Certain data sets will be automatically scanned and various data depictions (browse, summaries, etc.) created.

3.1.1.9 Preparation Notification

The processes that perform archive preparation functions shall be automatically notified when data are available for continued processing.

3.1.1.10 Provider Notification

Where applicable, the data provider will be automatically notified of completion of the CLASS ingest function for each data set.

3.1.2 Data Preparation and Quality Assurance

The CLASS data preparation component shall provide for both the automated and interactive quality assessment of ingested data that either triggers the re-ingest of data sets or provides for the internal modification of ingested data sets to comply with NESDIS data management standards. These functions cannot be bypassed in the normal sequence of processing. For data sets subject to re-ingest, there will be established, automated procedures with data suppliers to accomplish this function. Either a re-ingest or data set modification shall require automated notification of action to both providers and subscribers.

3.1.2.1 Automated and Interactive Data Assessment

Various algorithms shall be applied to ingested data sets, including generation of data depictions, summaries, etc. useful in determining scientific and technical quality.

3.1.2.2 Interactive Data Modification

NESDIS scientists and/or technicians shall be able to interactively modify data sets or metadata to reflect appropriate changes and/or corrections.

3.1.2.3 Inventory

Data set inventories shall be automatically updated noting any change in the quality, quantity, or status of each data set.

3.1.2.4 Re-Ingest Notification

CLASS shall provide notification to data supplier in order to automatically re-ingest data sets when necessary.

3.1.2.5 Subscriber Notification

Subscribers of all or a portion of each data set modified or re-ingested will be notified of such action and the reason(s).

3.1.2.6 Storage Notification

The processes that perform long-term (near-line) data storage functions shall be automatically notified when data are available for continued processing.

3.1.3 Data Storage

The CLASS storage component shall operate 24x7. It will provide for long-term, near-line storage of ingested data sets. Additionally, each physical CLASS facility will be operated in partnership with at least one other CLASS facility (mirroring) to provide mutual disaster backup/recovery services. All near-line storage will be robotically controlled; transparently accessible to all applications software; and managed by commercial of the shelf (COTS) storage management systems as an integral part of the archive metadata management component.

3.1.3.1 Physical Storage

Data shall be copied from network attached or network accessible (on-line) storage media to near-line, "long term" archive storage.

3.1.3.2 Remote Disaster Backup Storage

Data shall be copied from network attached or network accessible (on-line) storage media to a remote site

for disaster backup/recovery protection. As an intermediate step, the remote site may cache data to on-line digital media before processing to near-line storage. Archive metadata management information shall be exchanged automatically between the two sites.

3.1.3.3 Inventory

Data set inventories shall be automatically updated.

3.1.3.4 Local Disaster Backup Storage

Data shall be copied *from* a remote site for which the facility operates as the disaster backup. As an intermediate step, the facility may cache data to on-line digital media before processing to near-line storage. Archive metadata management information shall be exchanged automatically between the two sites.

3.1.4 Customer Access

A CLASS internet access portal shall be designed and built to enable novice customers, intermediate customers and power customers access to any and all data residing at any CLASS site. The portal shall provide for browsing of image data, a basic analysis tool for evaluation of product data, a spatial and temporal search capability, logical groupings of data and help services. The access portal shall also allow for customer registration and maintain other e-commerce capabilities (e.g. billing and accounting).

3.1.4.1 Data Discovery

A CLASS portal shall maintain a distributed (or centralized) relational database with rapid access to inventoried CLASS data sets, no matter their physical location. Client – Server type software shall be obtained (COTS) or built to distribute to the CLASS servers that host an instance of the database.

3.1.4.2 Graphical User Interface (GUI)

Based on existing web interfaces within NESDIS, the CLASS portal shall be designed with the best features that allow the customer to order and visualize any and all data desired. Examples of features required are, browsing of image data, a basic analysis tool for evaluation of product data, a spatial and temporal search capability, logical groupings of data and help services.

3.1.4.3 Search Algorithms

CLASS shall obtain or develop search algorithms which will properly perform geo-spatial searches of the various data sets (different formats, orbital and sector data sets, etc.) to be selected as a “hit” for the customer’s supplied parameters.

3.1.5 Data Retrieval/Repackaging

CLASS data retrieval shall operate 24x7. It shall provide archived data sets and the capability to subset or super-set, certain archived data sets as appropriate, to requesting CLASS processes. The physical location of the archived data will be transparent to these CLASS processes, and may be either in processor cache, on-line digital storage, or near-line digital media.

3.1.5.1 Retrieval

Data shall be automatically accessed from cache, from network attached or network accessible (on-line) storage media, or from near-line, “long term” archive storage. Requests for complete data sets shall be satisfied, by copying (virtually or physically) to customer accessible, on-line storage. Data to be subset or superset shall be copied (virtually or physically) to network attached or network accessible on-line storage.

3.1.5.2 Remote Recovery

If data are unavailable from local storage, backup volumes will be retrieved automatically from the remote (disaster) backup site, transferred to local, network attached on-line storage for subsequent “re-ingesting” to local near-line storage. Customer requested data shall then be processed as in 3.1.5.1 Retrieval.

3.1.5.3 Subset/Superset Processing

Requests received from the Customer Access component shall be used to spawn automated processes that either extract portions of the retrieved data sets or merge multiple data sets, as desired.

3.1.5.4 Distribution Notification

The processes that perform data distribution shall be automatically notified when data are available for further processing. This includes both data for customers and data for disaster recovery at a remote site.

3.1.6 Data Distribution

CLASS data distribution shall operate 24x7. This operation may be time critical in terms of NESDIS customer satisfaction. Service levels shall be established and guaranteed such that selected data shall be made available within n hours of request where n is determined through implementation of NESDIS data distribution policies and procedures. The facility may be staffed or un-staffed at any point in time; however, the operation shall be automatically and continuously monitored such that any system (hardware/software/telecommunications) or data problems that require human intervention shall automatically notify appropriate maintenance personnel. If the CLASS site serves as a disaster backup for another site, it will automatically distribute data requested via telecommunications links to the requesting site. Disaster recovery requests will have targeted data availability at n' hours of request, where n' shall be mutually agreed upon between the two facilities.

CLASS shall provide all external (to the site) requested data sets, subsets, and supersets via on-line digital storage which will be physically (or virtually) segregated from all other CLASS processing components, i.e., “outside the firewall.” Internally requested data sets will be stored on network attached or network accessible on-line storage for further NESDIS processing or reprocessing. Massive amounts of digital storage shall be characteristic of the retrieval component.

3.1.6.1 Staging/Access

Data shall be resident on on-line digital storage from the retrieval component. For external requests, data shall be physically or virtually transferred to customer accessible storage areas, or a physical media.

3.1.6.2 Customer Interface Notification

The processes that perform customer access shall be automatically notified when data are available for further processing, if appropriate.

3.1.7 Data Migration

The migration component at any CLASS-enabled site shall be identical in functionality. They may differ in the volumes of data and periodicity of migration. All archived data shall be stored on near-line, robotic libraries. As media technologies improve and/or robotic technologies age, planned upgrades will be exercised. Key to these upgrades will be the transparency of the migration process to either customer access or internal access to individual data sets within the archive period-of-record. Processing rates shall be measured as X/n where X is the archive period-of-record. As technologies improve, n would increase.

3.1.7.1 Staging

Data shall be automatically staged from near-line to on-line or cache storage.

3.1.7.2 Re-hosting

Data shall be automatically copied from on-line or cache storage to new near-line storage.

3.1.7.3 Retrieval Notification

The processes that perform all retrieval processing shall be automatically notified when data are available on new media.

3.1.8 *Functional Metadata*

3.1.8.1 Ingest

CLASS shall maintain inventory metadata such as: supplier; data/information identifier, date/time of ingest; quality checks; success/failure indication; volume; and data set name (DSN).

3.1.8.2 Archive/Preservation and Retrieval

CLASS shall maintain storage metadata for media (disk, platter, cartridge, etc); media identifier; start/end time of storage process; DSN; and associated ancillary data.

3.1.8.3 Customer Access

CLASS shall maintain metadata associated with customer identification; current available funds in customer account; date/time/duration of access; mode of access; volume of information accessed; nature and volume of data requested; and mode of distribution. [Note: Only customer metadata needed for diagnosing problems, security or usage measuring will be kept to be mindful of public privacy.] CLASS shall also maintain metadata of; browse imagery; data summaries; management information summaries; orbital projections; data set availability; distribution media alternatives; data distribution pricing policies and system user's guides.

3.1.9 *System Metadata*

3.1.9.1 Hardware operational statistics

CLASS shall maintain metadata of startup, operational, periodic, and aperiodic maintenance times as well as periodic volume throughput metrics.

3.1.9.2 Software operational information

CLASS shall maintain metadata of revision control information, start and end of operational life cycle, test data location, test data results, and module or process documentation.

3.1.9.3 System engineering information

CLASS shall maintain metadata of configuration diagrams, hardware capacities and functionality, and system (COTS) software.

3.2 Other CLASS Requirements

CLASS shall be capable of processing, storing, retrieving and distributing current and future NOAA data in a timely fashion. Volumes expected are found in Appendix C.

3.2.1 Archive Management

3.2.1.1 Archive Life

CLASS shall provide archive and distribution services for all openly available data, derived data products, and metadata in accordance with National Archive Records Administration (NARA) regulations.

3.2.1.2 Archive Configuration Control

The CLASS will maintain configuration control of hardware, software, diagrams, metadata and databases.

3.2.1.3 Archive Data

Data sets ingested by CLASS shall be managed in accordance with standard NESDIS data archive management practices and procedures.

3.2.1.4 Data Storage

Data, derived data products, and metadata will be migrated to long-term digital media within 4 hours of ingest.

3.2.1.5 Data Retrieval

All data and associated metadata or ancillary data shall be capable of being retrieved from long-term (near-line) storage within 60 minutes of an authorized request.

3.2.1.6 Data Deletion

The CLASS shall provide the capability to replace or remove specific versions of data, derived data products, and associated metadata. Such deletions will be made only with the concurrence of NESDIS management.

3.2.1.7 Archive Status Retrieval

CLASS shall be capable of retrieving information about the archive holdings for data management reporting and querying purposes.

3.2.1.8 Inventory

On-line customers shall have the capability of searching the inventory based on available data base metadata. Search results will be obtained within 15 minutes after entry or request.

3.2.1.9 Backup Archive

CLASS shall be capable of creating a backup copy of all data to be electronically or manually shipped to a remote (more than 50 miles) backup site. The backup site for the data type shall be identified in the inventory database.

3.2.1.10 Archive Validation

CLASS shall perform periodic archive integrity validation in accordance with procedures outlined by NESDIS management.

3.2.1.11 Archive Metadata

CLASS shall maintain data and data product descriptions including, but not limited to, data formats and structures; periods of observation; information about data integrity, and periods of holding.

3.2.2 Service Customer Requests

3.2.2.1 Interactive Customer Interface

CLASS shall provide an electronic, interactive customer interface for query, search, and order services as a 24-hour per day, 7 days per week (24x7) operation.

3.2.2.2 Customer Service-Human Interface

CLASS shall provide interactive customer support services through direct communication with CLASS personnel on a limited basis, i.e., normal Government business hours. CLASS shall provide electronic communication access (e.g., messaging, e-mail) on a 24x7 receipt basis.

3.2.2.3 Query and Data Order Validation

CLASS shall be able to validate customer queries and requests for data orders, to include customer account information and appropriate funding availability.

3.2.2.4 Data Denial

CLASS shall be capable of denying any data to identified customers for short and long periods of time. In addition CLASS shall be capable of denying certain data types to an array of customers for a (usually short) period of time.

3.2.3 New Customer Registration

CLASS shall accept and register new customers, keeping in mind each customer's privacy.

3.2.3.1 Data and Product Availability for Customers

CLASS shall have data available for customers within 24 hours of ingest at the CLASS site.

3.2.3.2 Data Availability

CLASS shall make data available to the customer as desired. This will include subscriber (push or pull) services as well as ad-hoc orders through the customer interface. CLASS will provide disaster backup/recovery services for all ingested data.

3.2.4 Billing and Accounting

3.2.4.1 Payment Requests and Verification

CLASS shall be able to request and verify payment prior to processing customer orders, when required. The customer interface will also provide all information regarding appropriate cost recovery of providing data in non-electronic form. It will interface with the NESDIS e-commerce cost-servicing component. The cost-servicing component will interact with the customer and provide the customer interface with the authorization to fulfill the pending request.

3.2.5 Account Maintenance

CLASS shall maintain customer registration and account information required for providing statistical data, and not to impede on the customer(s) privacy.

3.2.5.1 Customer Account Status Retrieval

CLASS shall be capable of securely providing personal account status and information to the customer and authorized customer service personnel.

3.2.6 Customer Product Distribution

3.2.6.1 Product Shipment

CLASS shall be able to ship and verify completeness of customer orders via electronic or physical means.

3.2.6.2 Customer Product Formats

CLASS shall be able to generate customer products in various approved NESDIS formats (TBD).

3.2.6.3 Time to Fulfill a Customer Request

Customer requests for online electronic delivery shall be fulfilled within 24 hours of the order. For customer requests for computer compatible media, CLASS shall be able to fulfill orders within 7 days of receipt of the request and validation of payment of any required costs of reproduction.

3.2.6.4 Customer Product Order Status

CLASS shall be able to generate, maintain and retrieve status information for each order processed.

3.2.6.5 Average Distribution Volume

CLASS shall be capable of producing and distributing (TBD) volumes of data and products per day on average.

3.2.6.6 Product Account Information Distribution

CLASS shall provide product account information to the customer, for each customer request fulfilled.

3.2.7 Management Report Generation

3.2.7.1 Data Volume Reports

CLASS shall be capable of generating mission reports, including volume of data received, retransmitted, and archived.

3.2.7.2 Statistical Performance Reports

CLASS shall be capable of generating reports for statistical performance of the system.

3.2.7.3 Product Distribution Statistics

CLASS shall be capable of generating reports, including the number of customer requests received, number processed, number shipped, number outstanding, and the turn around time to fulfill the requests. Statistics shall include number of data sets and volume per data set as well as a total of each.

3.2.8 Media Migration

3.2.8.1 Methodology

Data migration or transcription to improved media will be performed as determined by NESDIS management to preserve data integrity, on a scheduled basis. All migrations will be transparent to CLASS customers, i.e., will not interrupt data ingest, data storage, or data distribution functions of CLASS.

3.2.8.2 Migration Schedule

Migration will be performed when new, cost effective media are available or when forced by obsolescence. Migration to new, cost effective media will be done in a staggered basis (oldest media first) annually, or when technology (life expectancy of media) dictates.

3.3 Operational Requirements

The CLASS facility shall be an automated 24x7 operation. The facility may be staffed or un-staffed at any point in time; however, the operation shall be automatically and continuously monitored such that any component (hardware/software/telecommunications) or data problems that require human intervention shall automatically notify appropriate maintenance personnel. Prolonged system downtime will result in data loss; negative impacts on the data provider(s); and/or severe impacts on processing and storage facilities, thus hardware, storage, and telecommunications redundancies, “hot” backups, and fail-over operations shall be characteristic of this type.

3.3.1 Ingest of Supplied Data Streams

This ingest operation is time critical for many types of data, mainly the large array data sets, and these data are to be ingested and processed at a near-real-time rate. These ingest targets shall be such that CLASS shall complete the ingest process within n hours of observation where n is established through mutual agreement between NESDIS and the data supplier.

3.3.2 Telecommunications

It is anticipated that there will be more than one physical CLASS site. There are currently several data suppliers to NESDIS and the future will have even more suppliers of data to be archived. The physical location of the CLASS site(s) to the data supplier(s), shall be taken into consideration when assigning a data type to be archived by CLASS.

3.3.2.1 Bandwidth

Electronic connectivity will be via dedicated, NESDIS managed links capable of receiving 150% of the anticipated daily operational data streams in a 24-hour period.

3.3.2.2 Outages

Notification of telecommunications problems (dropped lines, garbled transmissions, etc.) shall be made within 2 hours of detection.

3.3.3 Receipt Mode

The majority of the CLASS data sets will arrive electronically. The following requirement is aimed at these data sets. Data that is collected and physically shipped to a CLASS site for archive shall follow current NOAA National Data Centers (NNDC) procedures for receipt of data.

3.3.3.1 Timeliness

Operational data will be received within 24 hours of observation. Receipt verification to the data supplier shall be made where appropriate.

3.3.4 Data Set Validation

CLASS shall validate, in as automated a manner as possible, the receipt of data from a data supplier.

3.3.4.1 Data Integrity

Data ingest integrity validation will be performed by CLASS within 24 hours of the completion of data set transmission. Integrity issues, identified during ingest, and retransmission requests, will be forwarded to the data supplier within 45 minutes of problem identification. Supplier storage capacity for retransmission may limit such retransmissions. CLASS will attempt to locate alternative supplier sites.

3.3.5 Inventory/Catalog

All data ingested into a CLASS site must be inventoried (cataloged) with enough functional metadata to fulfill customer search criteria for data discovery and storage location for data delivery.

3.3.5.1 Timeliness

CLASS will update an inventory of data sets within 60 minutes of completion and validation of transmission.

3.3.5.2 Retrospective Orders

The most current CLASS inventory of data sets will be made available to all retrospective customers, immediately upon update.

3.3.5.3 Customer Interface

CLASS inventory of data sets shall be available 24x7 for customer data access and selection.

3.3.6 Customer Notification

Automated notification of a predetermined class of customers (e.g., subscribers) of the ingest of data, derived data products, and metadata, meeting their selection criteria, shall occur within 60 minutes of inventory update.

3.3.7 Subscription Customer Delivery

It is expected that CLASS will have standing orders from customers to deliver data sets that meet their selection criteria, as soon as possible. These subscribers can be either “push” subscribers who decide that their server will be on-line at all times with sufficient space to receive expected data sets or “pull” subscribers that will fetch the data sets once notified via email.

3.3.7.1 Push Subscribers

Automated attempt to deliver data sets to a predetermined class of customers (“push” subscribers) will occur within 60 minutes of valid ingest completion.

3.3.7.2 Pull Subscribers

Data will be made accessible to a predetermined class of customers (“pull” subscribers) within 60 minutes of valid ingest completion. Data will remain available for “pull” for 72 hours from time of initial availability.

3.3.7.3 Volume Restriction for Electronic Delivery

CLASS shall have an adjustable limit for a volume (in megabytes) for a single data set delivery. CLASS shall also have an adjustable limit for a volume (in megabytes) for a single (multiple data sets) order. These limits shall be made know to the customer through the customer interface. As bandwidths are increased or saturated the limit can be adjusted accordingly.

3.3.8 Storage Management

CLASS requires that all data ingested will be stored in near-line storage after some predefined period of time in on-line storage.

3.3.8.1 Near Line Storage

Data will be automatically migrated/archived to long-term digital storage facilities (libraries) within 4 hours of ingest (which includes completion of quality checks of applicable lower volume data sets). Data will be available for customer access from storage as routine, NESDIS-managed environmental data.

3.3.9 Data Validation

CLASS will validate data received for format and content completeness and metadata accuracy. Some lower volume data sets may be read to assess quality (start and end times, data gaps, etc.).

3.3.10 Data Receipt Confirmation

CLASS shall provide confirmation of data receipt to the data suppliers that have prearranged to receive the confirmation.

3.3.11 Data Validation Confirmation

CLASS shall provide confirmation of status to the data suppliers that have prearranged to receive the validation, upon completion of data validation (automated and interactive).

3.3.12 Data Retransmission

CLASS will coordinate retransmission requests with data suppliers for incomplete or corrupted

data.

3.3.13 Retransmission Request Timeline

CLASS will provide retransmission requests for incomplete or corrupted data to the data supplier within 24 (TBR) hours of initial data receipt.

3.4 Programmatic Requirements

CLASS shall provide for growth, flexibility and expandability for future data sets. In as much as possible, CLASS shall use open systems architecture and provide process management for all CLASS component processes. CLASS shall provide for data migration and system component refreshment on a yearly basis dependent upon management schedule and budget constraints. CLASS shall also provide for technical support.

3.5 Special Requirements

CLASS software shall be maintained, under a configuration management and testing plan, that makes it transportable to any and all CLASS sites.

3.5.1 Accessibility

CLASS shall adhere to current NOAA and Federal regulations on accessibility (e.g. section 508).

3.5.1 Reprocessing Interface

CLASS shall provide an interface and functionality for customer reprocessing. Bulk data recalls, in a background mode (normal CLASS timeliness requirements do not apply) shall be available and moderated as to not degrade the normal operation of ingesting and archiving data sets. Reprocessed data, from the customer shall be able to be re-ingested with naming conventions to be agreed upon with the supplier and NESDIS management. (i.e., Using the same data set name would result in over-writing a previous version, which would then fall under section 3.2.1.6 Data Deletion, requiring NESDIS management approval.)

Appendix A – Functional Requirements for the NPP Archive and Distribution Segment (ADS) of CLASS

1.0 Introduction

1.1 *Identification*

This specification presents the Archive and Distribution Segment (ADS) functional and performance requirements for the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) mission. Launch is planned for late 2005. This document is based on the National Environmental Satellite, Data, and Information Service (NESDIS) Comprehensive Large Array-data Stewardship System (CLASS) architecture and encompasses the major functions associated with ingest, processing, storage, retrieval, distribution, and reprocessing of data and derived data products from NPP polar-orbiting sensors.

1.2 *Scope*

The ADS shall receive Raw Data Records (RDR), Sensor Data Records (SDR), and Environmental Data Records (EDR) from the NPP Integrated Data Processing Segment (IDPS) and Level 1b and Climate Data Records (CDR) from the NPP Science Data Segment (SDS). All of these data records shall be archived, as shall be certain ancillary calibration files and metadata upon which customers may search to identify, assess, and order data. Upon request, data products will be distributed to customers who may be billed for the nominal cost of fulfilling such requests. Additionally, the ADS shall have the capability of providing archived EDRs to the Science Data Segment for further or enhanced CDR generation.

1.3 *Purpose and Objective*

The purpose of this specification is to define the functional requirements for the ADS which integrate that segment with the operation of the IDPS and the SDS, as well as those requirements which are specific to NESDIS data management practices and procedures. These functional requirements correspond directly with those generic requirements that NESDIS intends to satisfy through the implementation and operation of the CLASS Information Technology (IT) architecture during the NPP and NPOESS era.

1.4 *Document Organization*

In keeping with the architectural concepts of CLASS, this specification is presented as logical functional groupings of requirements as they are outlined in the CLASS IT Architecture Study and matching NESDIS data management organization. This specification follows, to some extent, the logical progression of data, data products, and metadata from CLASS ingest, through storage and retrieval, to retrospective customer access and distribution. It is presented as an appendix to the initial CLASS Requirements and should be viewed in concert with that document.

2.0 Related Documents

2.1 *Applicable Documents*

AD-1	GSFC 429-99-02-03 June 12, 2000	National Polar-Orbiting Environmental Satellite System (NPOESS) Preparatory Project (NPP) Mission Requirements Specification
AD-2	Interface Requirements Document (IRD) April 3, 2001	National Polar-Orbiting Environmental Satellite System (NPOESS) Preparatory Project (NPP) Science Data Segment (SDS) and Archive and Distribution Segment (ADS) Interface
AD-3	GSFC 429_99_02_02 7/11/00	AD 10 NPP Mission System and Operations Concept (Volume 1)

2.2 *Reference Documents*

RD-1	GSFC 429-99-02-02 July 11, 2000	National Polar-Orbiting Environmental Satellite System (NPOESS) Preparatory Project (NPP) Mission System and Operations Concept
RD-2	GSFC 429-00-11-01	National Polar-Orbiting Environmental Satellite System (NPOESS) Preparatory Project (NPP) Science Data Segment Operations Concept
RD-3	CLASS ConOps July 20, 2001	CLASS Concept of Operations for the NPP ADS segment

3.0 **Interfaces**

3.1 *ADS Interface with IDPS*

The IDPS will serve as the primary supplier of near-real-time data and derived data products to the ADS. NPP data sets shall be ingested by the ADS via direct electronic telecommunication links established between the IDPS and the NESDIS CLASS facility for NPP. The NPP, operating as a precursor (risk assessment/reduction) mission to NPOESS, requires that the IDPS maintain an operational availability of 99.0% on a 24 hours per day by 7 days per week (24x7) basis. IDPS-to-ADS interface requirements, thus, will include the establishment of the ADS as a pseudo operational component of CLASS, managing a continuous ingest of sensor and product data, ancillary data, and metadata streams at the same service level of operation. The quality and speed of required telecommunications links are **TBD**, but at a minimum these links shall be capable of ingesting the totality of the IDPS operational data streams as made available by the IDPS. Additionally, these links shall be capable of the re-ingest of delayed or replacement data should transmission or ingest failures occur.

In addition to sensor and product data sets, the following companion data sets and information shall be supplied by the IDPS and shall be archived:

- IDPS calibration parameters;
- Ancillary data, including but not limited to:
 - National Center for Environmental Prediction (NCEP) data (multiple versions);
 - Digital elevation models;
 - Control point data;
 - Sensor calibration tables;
 - Buoy match up data; and

- Command and control data for geo-location
- Metadata
- Documentation; and
- IDPS product generation software.

3.2 *ADS Interface with SDS*

The ADS shall interface with the NPP Science Data Segment as specified in the SDS to ADS Interface Requirements Document (AD-2). SDS supplied data will be provided on a aperiodic basis. Delivery schedules will be determined through agreement and continuous coordination between NESDIS ADS data managers and the SDS coordinator(s). The following data and information types, are expected to be supplied by the SDS:

- Level 1b data;
- Climate Data Records (CDR);
- SDS applied calibration parameters;
- SDS derived, low-resolution browse imagery;
- SDS metadata;
- SDS process and algorithm documentation; and
- SDS algorithm application (product creation) software.

3.3 *ADS interface with C3S*

The ADS shall interface with the Command Control and Communication segment as specified in the C3S to ADS Interface Requirements Document (TBW). The ADS will receive mission guidance and supply status reports to the C3S.

3.4 *ADS Interface to Retrospective Customer Interface*

There are no NESDIS customer interface requirements that are unique to NPP, thus all ADS requirements in this area are a subset of those identified for CLASS implementation. These requirements are specified in the CLASS Requirements Document.

4.0 *Operational Requirements*

As described in RD-3, there is a system management element of the ADS system which will manage each of the other ADS elements of ingest management, metadata management, data and product archive/preservation and migration management, customer interface management, data and product retrieval and distribution management. The requirements for each of the elements are described below. The requirement of the system management element is to manage each of the other elements. All go through the system manager.

4.1 *Ingest of IDPS and SDS Supplied Data Streams*

The ADS shall ingest operational data records (RDR, SDR, EDR), associated metadata, operational calibration coefficients, and ancillary data from the IDPS, as per 3.1 above. The ADS shall ingest other data records (Level 1b and CDR), associated metadata, calibration coefficients, and ancillary data from the SDS, as per 3.2 above.

4.2 *Telecommunications*

4.2.1 Electronic connectivity to the IDPS shall be via dedicated, NESDIS managed links

capable of transmitting 150% of the anticipated daily operational data streams in a 24 hour period.

4.2.2 Electronic connectivity to the SDS shall be via dedicated NPP managed links capable of transmitting 150% of the anticipated science data streams

4.2.3 Notification of any telecommunications problems (dropped lines, garbled transmissions, etc.) shall be done within 2 hours of detection.

4.3 *Receipt Mode*

4.3.1 IDPS Operational data (RDR) shall be received within 20 hours of observation

4.3.2 IDPS derived product data sets (EDR) shall be received within 20 hours of creation.

4.3.3 SDS data will provided on a periodic or “as created@ basis, thus ingest schedules shall be determined through interaction and coordination between NESDIS CLASS managers and the SDS coordinator(s).

4.4 *Data Set Validation*

4.4.1 Data integrity validation shall be performed by the ADS during ingest within 24 hours of the completion of data set transmission.

4.4.2 Integrity issues, identified during ingest and retransmission requests, shall be forwarded to the data supplier within 45 minutes of problem identification. Supplier storage capacity for retransmission may limit such retransmissions. The ADS will attempt to locate alternative supplier sites.

4.5 *Inventory/Catalog*

4.5.1 The ADS shall update an inventory of data granules within 60 minutes of completion and validation of transmission.

4.5.2 The most current ADS inventory of data granules shall be made available to all retrospective customers, including the IDPS and ADS immediately upon update.

4.5.3 CLASS inventory of data granules shall be available 24x7 for customer data access and selection.

4.6 *Customer Notification*

Automated notification of a predetermined class of customers (e.g., subscribers) of the ingest of data, derived data products, and functional metadata meeting their selection criteria shall occur within 60 minutes of inventory update.

4.7 *Subscription Customer Delivery*

4.7.1 Automated attempt to deliver data sets to a predetermined class of customers (Apush@ subscribers) shall occur within 60 minutes of valid ingest completion.

4.7.2 Data shall be made accessible to predetermined class of customers (Apull@ subscribers) within 60 minutes of valid ingest completion.

4.7.3 Data shall remain available for Apull@ for 72 hours from time of initial availability.

4.8 *Storage Management*

4.8.1 At least one digital copy of NPP data shall be automatically migrated/archived to long-term digital storage facilities (libraries) within 4 hours of ingest.

4.8.2 NPP data shall be available for customer access from ADS storage as routine, non-restricted, NESDIS-managed environmental data.

4.9 *Science Product Ingest*

The ADS shall be capable of ingesting science products (Level 1B, and CDRs and associated metadata, science calibration coefficients, browse products, software, documentation and ancillary data from the SDS, which currently is the only known supplier.

4.10 *Reprocessed Science Product Ingest*

The SDS intends to reprocess portions of the NPP long-term record for scientific quality and enhanced data product evaluation/creation on an aperiodic basis. The ADS shall be capable of ingesting reprocessed climate data products (CDP)s and associated metadata from the SDS. Such ingest will be coordinated between the NESDIS CLASS facility manager(s) and the SDS NPP Coordinator(s).

4.11 *Average Ingest Volume*

The ADS shall be capable of ingesting, at a minimum, the daily volume of all the IDPS and SDS produced and openly available data. On an average, the volume is anticipated to be 2.25TB per 24 hour period.

4.12 *Concurrent Ingest*

The ADS shall be capable of ingesting IDPS and SDS data, metadata, and derived data products concurrently.

4.13 *Data Validation*

The ADS may validate data received for format and content completeness and functional metadata accuracy.

4.14 *Data Receipt Confirmation*

The ADS shall provide confirmation of data receipt to all data providers.

4.15 *Data Validation Confirmation*

The ADS shall provide confirmation of status to the data providers, upon completion of data validation.

4.16 *Data Retransmission*

The ADS shall coordinate retransmission requests with data providers for incomplete or corrupted data.

4.17 *Retransmission Request Timeline*

The ADS shall provide retransmission requests for incomplete or corrupted data to the data provider within 24 (TBR) hours of initial data receipt.

5.0 *Archive Management*

5.1 *Archive Life*

The ADS shall provide archive and distribution services for all openly available NPP data, derived data products, and metadata permanently, unless otherwise directed by NESDIS management.

5.2 *Archive Configuration Control*

The ADS shall maintain configuration control of hardware, software, and databases.

5.3 *Archive Data*

NPP data sets ingested by the ADS will be included in the NESDIS national environmental data archives upon validation of the receipt. Such data sets will be managed in accordance with standard NESDIS data archive management practices and procedures.

5.4 *Data Storage*

Data, derived data products, and metadata shall be migrated to long-term digital media within 4 hours of ingest.

5.5 *Reprocessed Data*

The ADS shall distinguish within the archive, data that have been reprocessed and received again, archiving the latest 2 versions of the data (TBR).

5.6 *Data Retrieval*

All data, derived data products, and associated data shall be capable of being retrieved from long-term storage within 30 minutes of authorized request.

5.7 *Data Deletion*

The ADS shall provide the capability to replace or remove specific versions of data, derived data products, and associated metadata. Such deletions will be made only with the authorization of NESDIS management and in accordance with disposition schedules established with NARA guidance.

5.8 *Archive Status Retrieval*

The ADS shall be capable of retrieving information about the archive holdings for data management reporting and querying purposes.

5.9 *Inventory*

On-line customers shall have the capability of searching the inventory based on specified criteria. Search results shall be obtained within 15 minutes after entry or request.

5.10 *Backup Archive*

The ADS does not have any unique requirements for disaster backup and recovery services and will fall under the CLASS requirements.

5.11 *Archive Validation*

The ADS shall perform periodic archive integrity validation in accordance with procedures outlined for CLASS.

6.0 *Service Customer Requests*

6.1 *Interactive Customer Interface*

The ADS shall provide an electronic, interactive customer interface for query, search, and order services as a 24-hour per day, 7 days per week (24x7) operation.

6.2 *Customer Service-Human Interface*

6.2.1 The ADS shall provide interactive customer support services through direct communication with ADS personnel on a limited basis, i.e., normal Government business hours.

6.2.2 The ADS shall provide electronic communication access (e.g., messaging, e-mail) on a 24x7 receipt basis.

6.3 *Query and Data Order Validation*

The ADS shall validate customer queries and requests for data orders, to include customer account information and appropriate funding availability.

6.4 *New Customer Registration*

The ADS shall accept and register new customers, keeping in mind the customer=s privacy.

6.5 *Data and Product Availability for Customers*

The ADS shall have data available to customers within 24 hours of ingest at the ADS.

6.6 *Data Availability for SDS*

6.6.1 The ADS shall make data available to the SDS as desired by the SDS. This shall include subscriber (push or pull) services as well as ad-hoc orders through the customer interface.

6.6.2 The ADS shall provide disaster backup/recovery services for the SDS for all ingested data.

7.0 *Billing and Accounting*

7.1 *Payment Requests and Verification*

7.1.1 The ADS shall request and verify payment as needed prior to processing customer orders.

7.1.2 The customer interface shall also provide all information regarding appropriate cost recovery of providing data in non-electronic form. It shall interface with the NESDIS CLASS e-commerce cost-servicing component.

7.1.3 The cost-servicing component, shall interact with the customer and provide the ADS customer interface with the authorization to fulfill the pending request.

7.2 *Account Maintenance*

The ADS shall maintain customer registration and account information required for providing statistical data, and not to impede on the customer's privacy.

7.3 *Customer Account Status Retrieval*

ADS shall be capable of securely providing personal account status and information to the customer and authorized customer service personnel.

8.0 *Customer Product Generation and Distribution*

8.1 *Customer Product Generation*

The ADS shall generate customer products based on validated customer product requests.

8.2 *Product Shipment*

The ADS shall ship and validate customer orders via electronic or physical means.

8.3 *Customer Product Formats*

The ADS shall generate customer products in various (TBD) formats.

8.4 *Time to Fulfill a Customer Request*

8.4.1 Customer requests for online electronic delivery shall be fulfilled within 24 hours of the order.

8.4.2 For customer requests for computer compatible media, the ADS shall fulfill orders within 7 days of receipt of the request and validation of payment of any required costs of reproduction.

8.5 *Customer Product Order Status*

The ADS shall generate, maintain and retrieve status information for each order processed.

8.6 *Average Distribution Volume*

The ADS shall be capable of producing and distributing 1.5 TB (TBR) volume of data and products per day on average.

8.7 *Product Account Information Distribution*

The ADS shall securely provide product account information to the customer, and authorized customer service personnel, for each customer request fulfilled.

9.0 Management Report Generation

9.1 *Data Volume Reports*

The ADS shall be capable of generating mission reports, including volume of data received, retransmitted, and archived.

9.2 *Statistical Performance Reports*

The ADS shall be capable of generating mission reports for statistical performance of the system.

9.3 *Product Distribution Statistics*

The ADS shall be capable of generating mission reports, including the number of customer requests received, number processed, number shipped, number outstanding, and the turn around time to fulfill the requests.

10.0 Media Migration

10.1 *Methodology*

10.1.1 Data migration or transcription to improved media shall be performed as determined by NESDIS management to preserve data integrity, on a scheduled basis.

10.1.2 All migrations shall be transparent to ADS customers, i.e., shall not interrupt data ingest, data storage, or data distribution functions of the ADS.

10.2 *Migration Schedule*

10.2.1 Migration shall be performed when new, cost effective media are available or when forced by obsolescence.

10.2.2 Migration to new, cost effective media shall be done approximately every 4 years (TBD).

Appendix B – Functional Requirements for the Initial Joint Polar System (IJPS) portion of CLASS

1.0 Introduction

1.1 Identification

The National Oceanic and Atmospheric Administration (NOAA) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) signed a Memorandum of Agreement in November 1998 for each agency to share resources to procure space hardware, to operate satellites, and to distribute environmental data collected by the satellites of each organization. The period when NOAA and EUMETSAT will share polar satellite resources begins with the Initial Joint Polar-orbiting Operational Satellite System (IJPS) that is planned to occur when MetOp-1 becomes operational in 2005/2006. During this period, NOAA will no longer operate a two-polar satellite mission. Instead, EUMETSAT will launch, operate, and distribute environmental data from the Meteorological Operational (MetOp) series of satellites (MetOp-1 & 2) that will be placed in a morning orbit. NOAA will continue to operate its afternoon Polar-orbiting Operational Environmental Satellite (POES) system (NOAA-N & N') constellation.

1.2 Scope

From NOAA-N (and N') POES will receive AVHRR/3, HIRS/4, AMSU-A1, AMSU-A2, MHS, DCS (A-DCS on N'), SEM/2 and SBUV/2 instrument data. From MetOp-1 (and 2) POES will receive AVHRR/3, HIRS/4, AMSU-A1, AMSU-A2, MHS, SEM/2, IASI, GOME/2, GRAS and ASCAT instrument data. NOAA will create NOAA 1b level data for the AVHRR/3, HIRS/4, AMSU-A1, AMSU-A2, MHS, DCS, A-DCS, SEM/2 and SBUV/2 instruments, regardless of the satellite. Currently it is To Be Determined (TBD) if NOAA will create or receive from Europe, EUMETSAT level 1 data from, IASI, GOME/2, GRAS and ASCAT instruments.

Note that NOAA level 1b data has the original raw data with calibration and earth location appended in the data set, while the EUMETSAT level 1b does not have the original raw data, but the radiance (calibration applied) in the data set. It is also TBD what level of data from these four instruments will be archived, but as of this date it is expected to be IASI Level 1c, and Level 1b for GOME, GRAS and ASCAT. EUMETSAT is currently planning on making a product level 0 for all instruments and archiving them in Europe. The scope of this document is only concerned with the NOAA archive plans.

1.3 Purpose and Objective

The purpose of this specification is to define the functional requirements for the IJPS data, as well as those requirements, that are specific to NESDIS data management practices and procedures. These functional requirements correspond directly with those generic requirements that NESDIS intends to satisfy through the implementation and operation of the CLASS Information Technology (IT) architecture during IJPS era. The objective of this appendix is to provide tractability to AD-1.

1.4 Document Organization

In keeping with the architectural concepts of CLASS, this specification is presented as logical functional groupings of requirements as they are outlined in the CLASS IT Architecture Study and matching NESDIS data management organization. This specification follows, to some extent, the logical progression of data, data products, and metadata from CLASS ingest, through storage and retrieval, to retrospective customer access and distribution. It is presented as an appendix to the

initial requirements and should be viewed in concert with that document.

2.0 Related Documents

2.1 *Applicable Documents*

AD-1	NO-IJ/OSD-99-0004-R0U0 11 Apr 2001	POLAR-ORBITING OPERATIONAL ENVIRONMENTAL SATELLITE SYSTEM REQUIREMENTS FOR INITIAL JOINT POLAR SYSTEM (RDN4 - Draft)
AD-2	7 Jun 2000	Level 1 data rates and volumes expected for IJPS instruments.
AD-3	25 Apr 2000	Polar Operational Environmental Satellite Ground Segment Upgrade Description & Requirements For Initial Joint Polar Satellite System

2.2 *Reference Documents*

RD-1	July 1999	Program Implementation Plan (PIP) For The Co-operation Between NOAA and EUMETSAT on the IJPS Program
RD-2	June 1999	NOAA's Ground Segment Project Plan For Participation in the Initial Joint Polar-orbiting Operational Satellite System

3.0 Interfaces

3.1 *CLASS Interface with IPD*

The OSDPD Information Processing Division will serve as the POES supplier of near-real-time data and derived data products to CLASS. IJPS data sets will be ingested by CLASS via direct electronic telecommunication links established between CEMSCS and the NESDIS CLASS facility for IJPS (TBD). The IJPS agreement requires that the Suitland complex maintain an operational availability of 98.4% on 24 hours per day by 7 days per week (24x7) basis. IPD-to-CLASS interface requirements, thus, will require managing a continuous ingest of sensor and product data, ancillary data, and metadata streams at the same service level of operation. The quality and speed of required telecommunications links are TBD, but at a minimum these links will be capable of ingesting the totality of the IJPS operational data streams as made available by IPD. Additionally, these links will be capable of the re-ingest of delayed or replacement data should transmission or ingest failures occur.

3.2 *IJPS Interface to Retrospective Customer Interface*

IJPS agreements between NOAA and EUMETSAT require the ability to deny data to certain customers, and groups of customers for both short and long duration. CLASS shall be capable of denying certain data types to certain customers for any duration of time.

4.0 Operational Requirements

4.1 *Ingest of IJPS Supplied Data Streams*

4.1.1 CLASS shall ingest all operational data sets, associated metadata and ancillary data from

the IJPS instruments to include: the four line elements, CPIDS, 1b* metadata, and digital signatures or MD5 checksums.

4.1.2 CLASS shall ingest all housekeeping data received from the POES satellites in the IJPS time period.

4.1.3 CLASS shall ingest all products generated by the PGS from data received from both the POES and MetOp satellites in the IJPS time period.

4.1.4 CLASS shall ingest all recorded data and associated databases from both the POES and MetOp satellites in the IJPS time period.

4.1.5 CLASS shall be capable of producing browse images from selected data sets.

4.2 *Telecommunications*

4.2.1 Electronic connectivity to IPD will be via dedicated, NESDIS managed links capable of transmitting 150% of the anticipated daily operational data streams in a 24 hour period.

4.2.2 Notification of any telecommunications problems (dropped lines, garbled transmissions, etc.) shall be done within 2 hours of detection.

4.3 *Receipt Mode*

4.3.1 IJPS Operational data shall be received within 24 hours of observation

4.3.2 IJPS era derived product data sets shall be received within 24 hours of creation (TBC).

4.4 *Data Set Validation*

4.4.1 Data completeness and accuracy validation shall be performed by CLASS during ingest within 24 hours of the completion of data set transmission.

4.4.2 Integrity issues, identified during ingest and retransmission requests, shall be forwarded to the data supplier within 60 minutes of problem identification. Supplier storage capacity for retransmission may limit such retransmissions.

4.4.3 The integrity of all data delivered to CLASS shall be ensured.

4.4.4 The integrity of all data retrieved from CLASS, by the IPD, shall be ensured.

4.5 *Inventory/Catalog*

4.5.1 CLASS shall update an inventory of data sets within 60 minutes of completion and validation of transmission.

4.5.2 The most current CLASS inventory of IJPS data sets shall be made available to all retrospective customers immediately upon update.

4.5.3 CLASS inventory of data sets shall be available 24x7 for customer data access and selection.

4.6 *Customer Notification*

- 4.6.1 Automated notification of a predetermined class of customers (e.g., subscribers) of the ingest of data, derived data products, and metadata meeting their selection criteria shall occur within 60 minutes of inventory update.
- 4.6.2 CLASS shall provide an interface for data and product distribution to the NOAA user community in the IJPS time period.
- 4.6.3 CLASS shall generate, archive, maintain, and distribute user documentation for NOAA instrument data and derived products.

4.7 *Subscription Customer Delivery*

- 4.7.1 Automated attempt to deliver data sets to a predetermined class of customers (“push” subscribers) shall occur within 60 minutes of valid ingest completion.
- 4.7.2 Data shall be made accessible to predetermined class of customers (“pull” subscribers) within 60 minutes of valid ingest completion (TBC).
- 4.7.3 Data shall remain available for “pull” for 72 hours from time of initial availability (TBC).

4.8 *Storage Management*

- 4.8.1 Data shall be automatically migrated/archived to long-term digital storage facilities (libraries) within 4 hours of ingest (which includes completion of quality checks).
- 4.8.2 IJPS data shall be available for customer access from storage as routine, NESDIS-managed environmental data.

4.9 *Average Ingest Volume*

CLASS shall be capable of ingesting, at a minimum, the daily volume of all the NOAA instrument data (AVHRR/3, HIRS/4, AMSU-A1, AMSU-A2, MHS, DCS (A-DCS on N’), SEM/2 and SBUV/2), produced and openly available data. On an average, the volume is anticipated (TBD) per 24 hour period.

4.10 *Concurrent Ingest*

CLASS shall be capable of ingesting IJPS data, metadata, and derived data products concurrently.

4.11 *Data Validation*

CLASS shall validate data received for format and content completeness and metadata accuracy. If available from the data supplier daily logs shall be ingested and used to aid in validation.

4.12 *Data Receipt Confirmation*

CLASS shall provide confirmation of data receipt to the data provider.

4.13 *Data Validation Confirmation*

Currently there is no requirement for IJPS to provide confirmation of status to the data provider, this is (TBD).

4.14 *Data Retransmission*

CLASS shall coordinate retransmission requests with the data provider for incomplete or corrupted data (TBC).

4.15 *Retransmission Request Timeline*

CLASS shall provide retransmission requests for incomplete or corrupted data to the data provider within 24 (TBR) hours of initial data receipt.

5.0 *Archive Management*

5.1 *Archive Life*

CLASS will provide archive and distribution services for all non-restrictive IJPS data, derived data products, and metadata in accordance with NESDIS requirements.

5.2 *Archive Configuration Control*

CLASS shall maintain configuration control of hardware, software, and databases.

5.3 *Archive Data*

IJPS data sets ingested by the POES system in IPD, will be included in the NESDIS national environmental data archives upon validation of the receipt. Such data sets will be managed in accordance with standard NESDIS data archive management practices and procedures.

5.4 *Data Storage*

Data, derived data products, and metadata shall be migrated to long-term digital media within 4 hours of ingest.

5.5 *Reprocessed Data*

No unique requirements identified at this time, however must be in accordance with section 5.7. Currently reprocessed data is given the same data set name, which over writes the previous version.

5.6 *Data Retrieval*

All data, derived data products, and associated data shall be capable of being retrieved from long-term storage within 3 hours of authorized request.

5.7 *Data Deletion*

CLASS shall provide the capability to replace or remove specific versions of data, derived data products, and associated metadata. Such deletions will be made only with the concurrence of NESDIS management.

5.8 *Archive Status Retrieval*

CLASS shall be capable of retrieving information about the archive holdings for data management reporting and querying purposes.

5.9 *Inventory*

On-line customers shall have the capability of searching the IJPS inventory database with search

results obtained within 15 minutes after submission of entry or request.

5.10 Backup Archive

CLASS shall maintain a geographically separate backup copy of all IJPS data received.

5.11 Archive Validation

IJPS data does not have any unique requirements and shall perform periodic archive integrity validation in accordance with procedures outlined for CLASS.

6.0 Service Customer Requests

6.1 Interactive Customer Interface

CLASS shall provide an electronic, interactive customer interface for query, search, and order services as a 24 hour per day, 7 days per week (24x7) operation.

6.2 Customer Service-Human Interface

6.2.1 CLASS shall provide interactive customer support services through direct communication with help desk personnel on a limited basis, i.e., normal Government business hours.

6.2.2 CLASS shall provide electronic communication access (e.g., messaging, e-mail) on a 24x7 receipt basis.

6.3 Query and Data Order Validation

CLASS shall validate customer queries and requests for data orders, to include customer account information and appropriate funding availability as required (TBC).

6.4 New Customer Registration

CLASS shall accept and register new customers, keeping in mind the customer's personal privacy.

6.5 Data and Product Availability for Customers

CLASS shall have data available to customers within 24 hours of ingest.

7.0 Billing and Accounting

7.1 Payment Requests and Verification

7.1.1 CLASS shall request and verify payment prior to processing customer orders, when appropriate.

7.1.2 The customer interface shall also provide all information regarding appropriate cost recovery of providing data in non-electronic form. It will interface with the NESDIS CLASS e-commerce cost-servicing component.

7.1.3 The cost-servicing component shall interact with the customer and provide CLASS customer interface with the authorization to fulfill the pending request.

7.2 *Account Maintenance*

CLASS shall maintain customer registration and account information required for providing statistical data, and not to impede on the customer's privacy.

7.3 *Customer Account Status Retrieval*

CLASS shall be capable of providing customer status and account information to customers.

8.0 Customer Product Generation and Distribution

8.1 *Customer Product Generation*

CLASS shall generate customer products based on validated customer product requests.

8.2 *Product Shipment*

8.2.1 CLASS shall operate in accordance with the Data Denial Implementation Plan for IJPS data.

8.2.2 CLASS shall ship customer products via electronic or physical means.

8.2.3 CLASS shall be capable of distributing pre-processed recorded data and derived products from both the morning and the afternoon satellites to the respective user communities.

8.3 *Customer Product Formats*

CLASS shall generate customer products in various (TBD) formats.

8.4 *Time to Fulfill a Customer Request*

8.4.1 Customer requests for online electronic delivery shall be fulfilled based on volume (TBD GB per day, TBD tapes per week, etc.).

8.4.2 For customer requests for computer compatible media CLASS shall fulfill orders based on volume of the request and validation of payment of any required costs of reproduction.

8.5 *Customer Product Order Status*

8.5.1 CLASS shall generate, maintain and retrieve status information for each order processed.

8.5.2 CLASS shall provide digital signatures with all data distributed by the Archive Facility to the NOAA user community.

8.6 *Average Distribution Volume*

8.6.1 CLASS shall be capable of producing and distributing TBD GB volume of data and products per day on average.

8.6.2 CLASS shall operate in accordance with NOAA and US Department of State regulations regarding distribution of US Government data.

8.6.3 CLASS shall operate in accordance with EUMETSAT and NOAA agreements regarding redistribution of EUMETSAT instrument data and products.

- 8.6.4 CLASS shall operate in accordance with US Space Command and NOAA agreements regarding redistribution of Four Line Element ephemeris data.
- 8.6.5 CLASS shall provide authorized users with secure (e.g. encrypted) access to Four Line Element ephemeris data during periods when public access is restricted.

8.7 *Product Account Information Distribution*

CLASS shall provide product account information to the customer, for each customer request fulfilled.

8.8 *User Interface*

- 8.8.1 CLASS user interface shall provide linkages to the UMARF user interface.
- 8.8.2 CLASS user interface shall allow for compatibility with EUMETSAT Polar System data set naming conventions.

9.0 *Data Management*

- 9.1 The NOAA Space Environment Center shall be responsible for management of the MetOp SEM-2 data archive.
- 9.2 The NOAA National Oceanographic Data Center shall be responsible for management of the MetOp ASCAT data archive.
- 9.3 The NOAA National Climatic Data Center shall be responsible for management of the MetOp GDS data archive.
- 9.4 The NOAA National Climatic Data Center shall be responsible for management of the MetOp AMSU-A data archive.
- 9.5 The NOAA National Climatic Data Center shall be responsible for management of the MetOp IASI data archive.
- 9.6 The NOAA National Climatic Data Center shall be responsible for management of the MetOp GOME data archive.
- 9.7 The NOAA National Climatic Data Center shall be responsible for management of the MetOp GRAS data archive.
- 9.8 The NOAA National Climatic Data Center shall be responsible for management of the MetOp HIRS data archive.
- 9.9 The NOAA National Climatic Data Center shall be responsible for management of the POES MHS data archive.
- 9.10 The NOAA National Climatic Data Center shall be responsible for management of the MetOp MHS data archive.
- 9.11 The NOAA National Climatic Data Center shall be responsible for management of the POES CPIDS database archive.
- 9.12 The NOAA National Climatic Data Center shall be responsible for management of the

POES Four Line Element ephemeris database archive.

10.0 Management Report Generation

10.1 Data Volume Reports

CLASS shall be capable of generating mission reports, including volume of data received, retransmitted, and archived.

10.2 Statistical Performance Reports

CLASS shall be capable of generating mission reports for statistical performance of the system.

10.3 Product Distribution Statistics

CLASS shall be capable of generating mission reports, including the number of customer requests received, number processed, number shipped, number outstanding, and the turn around time to fulfill the requests.

11.0 Media Migration

11.1 Methodology

11.1.1 Data migration or transcription to improved media shall be performed as determined by NESDIS management to preserve data integrity, as time and resources permit, on a scheduled basis.

11.1.2 All migrations shall be transparent to the customers, i.e., shall not interrupt data ingest, data storage, or data distribution functions of CLASS.

11.2 Migration Schedule

11.2.1 Migration shall be performed when new, cost effective media are available or when forced by obsolescence.

11.2.2 Migration to new, cost effective media shall be done approximately every 4 years (TBD).

Acronym List

24x7	24 hours per day by 7 days per week
ADC	Analog-to-Digital Converters
ADS	Archive and Distribution Segment
APS	Application Processing System
C3S	Command, Control and Communications Segment
CDR	Climate Data Record
CLASS	Comprehensive Large Array-data Stewardship System
COFR	Cost of Fulfilling a User Request
CONOPS	Mission System and Operations Concept
DOD	Department of Defense
EDRs	Environmental Data Records
EOS	Earth Observing System
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
GSFC	Goddard Space Flight Center
IDPS	Interface Data Processing Segment
IJPS	Initial Joint Polar-orbiting Operational Satellite System
IORD	Integrated Operational Requirements Document
IPO	Integrated Program Office
IRD	Interface Requirements Document
IT	Information Technology
MetOp	Meteorological Operational series of satellites
NASA	National Aeronautics and Space Agency
NAVOCEANO	Naval Oceanographic Office
NCEP	National Center for Environmental Prediction
NESDIS	National Environmental Satellite, Data, and Information Service
NOAA	National Oceanic and Atmospheric Administration
NPOESS	National Polar-orbiting Operational Environmental Satellite System
NPP	NPOESS Preparatory Project
QA	Quality Assurance
RDRs	Raw Data Records
RT	Real time
SDRs	Sensor Data Records
SDS	Science Data Segment
TBC	To Be Confirmed
TBD	To Be Determined
TBR	To Be Resolved
TBS	To Be Supplied
TDR	Temperature Data Records
UMARF	EUMETSAT Archive Facility
USAF	United States Air Force
VIIRS	Visible/Infrared Imager/Radiometer Suite

Appendix C - Cumulative Growth Chart

